

WHAT IS CLAIMED IS:

10057355-1020702
1. A color ink-jet recording apparatus using a black recording head that ejects black ink on the basis of black image data and color recording heads that ejects color ink on the basis of color image data, the color ink permeating through a recording medium at a higher speed than said black ink, the apparatus completing a record image in a predetermined recording area on said recording media by causing said recording heads to perform a plurality of scanning operations in said predetermined recording area, the apparatus comprising:

data dividing means, which uses division patterns for each of said recording scans to allot black image data corresponding to said predetermined recording area to each of said recording scans, and to allot color image data corresponding to said predetermined recording area to each of said recording scans,

wherein said data dividing means sets different allotment rates for the division patterns for said black image data and color image data used during the same recording scan.

2. A color ink-jet recording apparatus according to claim 1, wherein division pattern having different allotment rates are used as the division patterns for said black image data and color image data.

3. A color ink-jet recording apparatus according to claim 1, further comprising black image data allotment rate setting means for setting, for each of said recording scans, allotment rates for the division patterns for said black image data; and

color image data allotment rate setting means for setting, for each of said recording scans, allotment rates for the division patterns for said color image data; wherein both said image data allotment rate setting means set different allotment rates for the division patterns for said black image data and color image data used during the same recording scan.

4. A color ink-jet recording apparatus according to claim 3, wherein if said black image data allotment rate setting means sets an allotment rate higher than a predetermined reference allotment rate, the color image data allotment rate setting means sets an allotment rate lower than said reference allotment rate, and if said black image data allotment rate setting means sets an allotment rate lower than said reference allotment rate, the color image data allotment rate setting means sets an allotment rate higher than said reference allotment rate.

5. A color ink-jet recording apparatus according to claim 4, wherein said reference allotment rate is $100/N\%$ where

N is the number of a plurality of scanning operations performed in said predetermined recording area.

6. A color ink-jet recording apparatus according to claim 1, wherein when a black image is to be formed in said predetermined area, before or after the black ink is caused to impact the recording medium, at least one of said plural types of color ink is caused to impact locations onto which the black ink is ejected.

7. A color ink-jet recording apparatus according to claim 1, further comprising a thinning means, which thins said black image data at a predetermined thinning rate and causes the plural types of color ink to impact portions of the recording area in which said black image data has been thinned.

8. A color ink-jet recording apparatus according to claim 1, wherein at least one of said plural types of color ink is reactive and tends to cause said black ink to solidify or cohere when contacting with said black ink.

9. A color ink-jet recording apparatus according to claim 1, wherein said recording heads executes recording only during scans in one of the forward and backward scanning directions, and in the scanning direction in which the recording is carried out, said color recording heads are

arranged in front of said black recording head.

10. A color ink-jet recording apparatus according to claim
1, wherein if said recording heads carry out recording in
5 both the forward and backward scanning directions, then
during the first recording scan, said color image data has
a higher allotment rate than said black image data.

11. A color ink-jet recording apparatus according to claim
10 1, wherein said plural color ink types include cyan,
magenta, and yellow ink.

12. A color ink-jet recording apparatus according to claim
1, wherein said recording heads exert thermal energy to
15 generate bubbles in the ink so that energy generated by
the bubbles causes the ink to be ejected.

13. A color ink-jet recording method using a black
recording head that ejects black ink on the basis of black
20 image data and color recording heads that ejects color ink
on the basis of color image data, the color ink permeating
through a recording medium at a higher speed than said black
ink, the method completing a record image in a
predetermined recording area on said recording medium by
25 causing said recording heads to perform a plurality of
scanning operations in said predetermined recording area,
the method comprising the steps of:

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dividing black and color image data corresponding to said predetermined recording area into black and color image data corresponding to each of said recording scans by using division patterns for each of said recording scans
5 to allot black image data corresponding to said predetermined recording area to each of said recording scans, while allotting color image data corresponding to said predetermined recording area to each of said recording scans; and

10 ejecting said black ink and said color ink from said black recording head and said color recording heads during each of said recording scans on the basis of the data allotted to each of said recording scans in said dividing step;

15 wherein said data dividing step sets different allotment rates for the division patterns for said black image data and color image data used during the same recording scan.

20 14. A color ink-jet recording method according to claim 13, wherein division pattern having different allotment rates are used as the division patterns for said black image data and color image data.

25 15. A color ink-jet recording method according to claim 13, further comprising the black image data allotment rate setting step of setting, for each of said recording scans,

allotment rates for the division patterns for said black image data; and

the color image data allotment rate setting step of setting, for each of said recording scans, allotment rates
5 for the division patterns for said color image data;

wherein both said image data allotment rate setting steps set different allot rates for the division patterns for said black image data and color image data used during the same recording scan.

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16. A color ink-jet recording method according to claim 15, wherein if said black image data allotment rate setting step sets an allotment rate higher than a predetermined reference allotment rate, then the color image data
15 allotment rate setting step sets an allotment rate lower than said reference allotment rate, and if said black image data allotment rate setting step sets an allotment rate lower than said reference allotment rate, the color image data allotment rate setting step sets an allotment rate
20 higher than said reference allotment rate.

17. A color ink-jet recording method according to claim 16, wherein said reference allotment rate is $100/N\%$ where N is the number of a plurality of scanning operations
25 performed in said predetermined recording area.

18. A color ink-jet recording method according to claim

13, wherein when a black image is to be formed in said predetermined area, before or after the black ink is caused to impact the recording medium, at least one of said plural types of color ink is caused to impact locations onto which
5 the black ink is ejected.

19. A color ink-jet recording method according to claim 13, further comprising a thinning step, which thins said black image data at a predetermined thinning rate and
10 causes the plural types of color ink to impact portions of the recording area in which said black image data has been thinned.

20. A color ink-jet recording method according to claim 13, wherein at least one of said plural types of color ink is reactive and tends to cause said black ink to solidify or cohere when contacting with said black ink.
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21. A color ink-jet recording method according to claim 13, wherein said recording heads executes recording only during scans in one of the forward and backward scanning directions, and in the scanning direction in which the recording is carried out, said color recording heads are arranged in front of said black recording head.
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22. A color ink-jet recording method according to claim 13, wherein if said recording heads carry out recording

in both the forward and backward scanning directions, then during the first recording scan, said color image data has a higher allotment rate than said black image data.

5 23. A color ink-jet recording method according to claim 13, wherein said plural color ink types include cyan, magenta, and yellow ink.

10 24. A color ink-jet recording method according to claim 13, wherein said recording heads exert thermal energy to generate bubbles in the ink so that energy generated by the bubbles causes the ink to be ejected.

15 25. A method of processing image data used in a color ink jet recording apparatus using a black recording head that ejects black ink on the basis of black image data and color recording heads that ejects color ink on the basis of color image data, the color ink permeating through a recording medium at a higher speed than said black ink, the apparatus
20 completing a record image in a predetermined recording area on said recording medium by causing said recording heads to perform a plurality of scanning operations in said predetermined recording area, the method comprising the step of:

25 dividing black and color image data corresponding to said predetermined recording area into black and color image data corresponding to each of said recording scans

by using division patterns for each of said recording scans to allot black image data corresponding to said predetermined recording area to each of said recording scans, while allotting color image data corresponding to said predetermined recording area to each of said recording scans,

wherein each of the division patterns for said black image data and color image data used during the same recording scan has different allotment rates.

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26. A program for executing image processing on image data used in a color ink jet recording apparatus using a black recording head that ejects black ink on the basis of black image data and color recording heads that ejects color ink on the basis of color image data, the color ink permeating through a recording medium at a higher speed than said black ink, the apparatus completing a record image in a predetermined recording area on said recording medium by causing said recording heads to perform a plurality of scanning operations in said predetermined recording area, the method comprising the step of:

dividing black and color image data corresponding to said predetermined recording area into black and color image data corresponding to each of said recording scans by using division patterns for each of said recording scans to allot black image data corresponding to said predetermined recording area to each of said recording

scans, while allotting color image data corresponding to said predetermined recording area to each of said recording scans,

wherein each of the division patterns for said black
5 image data and color image data used during the same
recording scan has different allotment rates.

27. A computer-readable storage medium storing the program set forth in claim 26.

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